

A COMPARATIVE STUDY BETWEEN MODIFIED BASSINI REPAIR AND LICHTENSTEIN MESH REPAIR IN INGUINAL HERNIA

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ABSTRACT

Background: Hernias are among the oldest known afflictions of mankind. 75% of all abdominal wall hernias are found in the groin. Of all groin hernias, 95% are hernias of the inguinal canal. Inguinal hernia is a common disorder affecting approximately 5 to 10% of the adult population worldwide. Worldwide more than 20 million patients undergo inguinal hernia repair annually and it is one of the most frequently performed operations in general surgery. Tension-free repair (Lichtenstein mesh repair) has been established as the method of choice for the management of uncomplicated inguinal hernia. **Aim:** is to study the outcomes of techniques with regards to Operating time, Ambulation time, Duration of hospital stay, Postoperative pain & complications and to look for any recurrence with regular follow up after 1 week, at one month, three months, six months and 12 months. **Materials and Methods:** This is a prospective study carried out in the department of surgery of Guwahati medical college. This study includes 100 patients of which 50 underwent Modified Bassini repair and 50 underwent Lichtenstein mesh repair. Hernia was diagnosed by clinical and onUSG finding. **Results:** The highest incidence is in 51-60 age group (30%) & mean age in Lichtenstein mesh repair (LMR) and Modified Bassini repair (MBR) group are 42.32 yrs and 43.46 yrs respectively, all are male patients, majority of patients were smokes (60 out of 100 patients), seen commonly among the manual labourers and the farmers, accounting for 27% and 22% respectively, 74% presented with only swelling and 26% presented with both pain and swelling, with higher incidence of right side indirect inguinal hernia (62 out of 100). The mean duration of surgery in LMR was 42.66 minutes whereas in MBR it was 48.44 minutes. 18 patients of LMR & 20 patients of MBR had mild pain. 17 patients of LMR and 28 patients of MBR had moderate pain. Seroma was found 8 cases in LMR and 1 case in MBR. Incidence of haematoma was 7(14%) in LMR and 1(2%) in MBR group. Chronic pain occurs in 16% of MBR group and only 4 % in LMR group. 1 recurrence was noted in the Modified Bassini repair group. The ambulatory time was (3.12+/-0.87 days) days in LMR and(3.98+/-0.82 days) days in MBR. The mean period of hospitalization was 4.92 days in case of LMR and 5.86 days in case of MBR. Mean day of return to normal activity is n MBR and LMR respectively 12.26+/-3.75 and 12.94+/-3.49days days. **Conclusions:** Surgery is the mainstay in treatment of inguinal hernias. Correction of precipitating conditions is important for successful outcome. Lichtenstein tension free mesh repair has the commonest and gold standard of procedure undertaken. However, tissue repair has the scope to become an alternate procedure in emergency settings where the use of mesh is contraindicated or those patients who disagree the use of mesh.

KEYWORDS: Hernia, Lichtenstein mesh repair (LMR), Modified Bassini repair (MBR), Seroma, chronic groin pain, haematoma, recurrence.

BACKGROUND

The word "hernia" is derived from the Greek word, *hernios*, meaning a bud or shoot.^[1] Of all groin hernias, 95 percent are hernias of the inguinal canal, with the remainder being femoral hernia defects.^[2] Hernia is defined as a protrusion of a viscus through an abnormal opening in the wall of the cavity in which it is

contained.^[3] 75 percent of all abdominal wall hernias are found in the groin.^[4] Inguinal hernia^[5] is a common disorder affecting approximately 5 to 10% of the adult population worldwide. It is one of the most frequently performed operations in general surgery.

Surgical techniques have rapidly evolved since Eduardo Bassini proposed his first successful reconstruction of the inguinal floor which was pure tissue repair of hernia. Classical suture-based repairs described by Bassini^[8], modified (North American) Bassini repair.^[9] Shouldice and McVay and Dasarda have the advantage over permanent mesh repairs in that they do not introduce significant permanent foreign body material but require expertise to do the dissection of the inguinal floor. The tension free repair caused a dramatic drop in the recurrence rate has become popular which has significant impact in inguinal hernia repair which includes Lichtenstein tension-free hernioplasty, Plug and Patch repair, Prolene hernia system, Stoppa repair, but it has its own set of complications like chronic pain^[12], discomfort, mesh rejection and host reaction^[13], infection^[14], mesh migration, meshoma^[15] foreign body sensations, and testicular atrophy.^[16] Several meta-analysis concluded that use of mesh is superior to the non-mesh operations in inguinal hernia surgery.^[17] Tension-free repair (Lichtenstein mesh repair) has thus, been established as the method of choice for the management of uncomplicated inguinal hernia. Laparoscopic tension-free mesh repair of inguinal hernia based on a preperitoneal approach has added to the armamentarium of the general surgeon. The most common techniques include a totally extraperitoneal (TEP) and transabdominal preperitoneal (TAPP) approach.

MATERIALS AND METHODS

The present study is a hospital based observational study that has been conducted in 100 cases of inguinal hernia who were admitted and underwent operative treatment in the Department of General Surgery in Gauhati Medical College and Hospital, Guwahati, Assam during the study period from 1st April 2020 to 31st March 2021. The 100 cases of inguinal hernia were divided randomly into two groups. One group of 50 cases underwent open tissue-based Modified Bassini repair and the other group of 50 cases underwent open Lichtenstein tension-free hernioplasty. These are open anterior approach techniques.

Operative procedure

Skin incision was made 2.5 cm above and parallel to the inguinal ligament, the subcutaneous fat was opened in the length of the incision down to the external oblique aponeurosis.

1) Bassini repair: The inguinal canal open widely by splitting the aponeurosis of the external oblique next opened the transversalis fascia from the pubic tubercle to beyond the internal ring to dissect and ligate the sac high in the retroperitoneal space. Repairing the transversalis fascia and of reinforcing the posterior wall of the canal, is done by suturing the internal oblique and transversus abdominis muscles, as well as the upper leaf of the transversalis fascia, in one layer to the lower leaf of the

transversalis fascia and the inguinal ligament, using interrupted sutures of silk.

2) The Modified Bassini repair: The lower border of the conjoined muscles and tendon and the upper surface of the inguinal ligament were carefully cleared of fat and areolar tissue. The muscles and tendons were lifted forwards with dissecting forceps and five or six stitches were inserted at about 1cm intervals between them and the inguinal ligament. The most lateral surface was inserted first, picking up tissue at the margins of the deep ring and the ring around the emerging cord. The most medial suture was placed under the periosteum overlying the pubic tubercle.

3) The Lichtenstein Tension-free repair: The Lichtenstein technique expands the domain of the inguinal canal by reinforcing the inguinal floor with a prosthetic mesh, thereby minimizing tension in the repair. The inguinal canal is dissected to expose the shelving edge of the inguinal ligament, the pubic tubercle, and sufficient area for mesh. The mesh is a 7×15 cm rectangle with a rounded medial edge, and it must be large enough to extend 2 to 3 cm superior to Hesselbach's triangle. The medial edge of the mesh is affixed to the anterior rectus sheath such that it overlaps the pubic tubercle by 1.5 to 2 cm. Fixation is continued along the shelving edge of the inguinal ligament from medial to lateral, ending at the internal ring. The upper tail of the mesh is then fixed to the internal oblique aponeurosis and the medial edge to the rectus sheath using a synthetic, absorbable suture.

Closure

Cord structures were placed over the repaired posterior wall. The external oblique aponeurosis was reapproximated either by simple suture or preferably by overlapping, using absorbable sutures. The superficial ring was then reconstituted such that it fitted snugly around the cord.

POST-OPERATIVE COMPLICATIONS

- 1. Pain:** Post-operative pain at 24 hours after surgery was assessed using Verbal Graphic Rating Scale(VRS). VRS- A verbal rating scale (VRS) consists of a list of adjectives describing different levels of pain intensity or pain effect, ordered from least to most intense.
- 2. Seroma:** Seroma was identified as loculated collection over the surgical site that was confirmed by clinical examination finding. Treatment consisted of reassurance and warm compression to accelerate resolution.
- 3. Haematoma:** Hematomas were defined as localized blood collections or as diffuse bruising over the operative site. Intermittent warm and cold compression were advised for resolution. If conservative treatment failed, drainage was done.
- 4. Wound infection:** Wound infection was defined as presence of purulent discharge from the wound.

Treatment consisted of parenteral antibiotics and antiseptic dressing.

5. **Testicular pain and swelling:** Post-operative testicular pain and swelling was defined as painful enlargement of the testicle (2-3 times the normal size), which was woody hard in consistency, and with or without low grade fever. It usually developed between 2-5 days post-operatively, and lasted for several days.
6. **Chronic groin pain:** Chronic groin pain was defined as pain persisting three months after inguinal hernia repair. Its nature and severity were evaluated by symptomatology and VRS.
7. **Testicular atrophy:** Testicular atrophy was defined as a painless and non-tender reduced size of the testes on the operated side.
8. **Mesh related complications:** Mesh related complications were defined as localized abscess, discharging sinus, mesh migration etc.

FOLLOW UP

Regular follow up was done after 1 week, 1 month, 3 months, 6 months and 12 months post-operatively by clinical assessment of post-operative complication, recurrence of hernia.

STATISTICAL ANALYSIS

Bar diagram and Pie-Chart were used to describe the descriptive statistics. Chi square or Fishers exact test is

used to evaluate association between categorical variables. Data were checked for normality using Kolmogorov-Smirnova and Shapiro-Wilk test. Independent T test and ANOVA is used to compare mean difference between two groups depending on fulfillment of normality assumption for continuous variables. All data were analyzed using SPSS version 21. A p value less than 0.05 is considered as statistically significant at 5% level of significant.

RESULTS

The results and observations of this study are described as follows.

Table 1: Comparison of Age incidences in two operative groups.

Age group	Lichtenstein Mesh Repair	Modified Bassini Repair	Total
<20	5(10%)	3(6%)	8(8%)
21-30	7(14%)	7(14%)	14(14%)
31-40	10(20%)	12(24%)	22(22%)
41-50	12(24%)	11(22%)	23(23%)
51-60	15(30%)	15(30%)	30(30%)
61-70	1(2%)	1(2%)	2(2%)
71-80	0(0%)	1(2%)	1(1%)
Total	50(50%)	50(50%)	100(100%)

Table 2: Mean age in MBR and LMR.

	No	Mean AGE(YRS)	SD	Minimum	Maximum	p value
LMR	50	42.32	13.07	18	70	0.666
MBR	50	43.46	13.253	19	75	
Total	100	42.89	13.108	18	75	

In the present study, the maximum number of patients were in 4th and 5th decades with highest number in 51-60 age group with 30 % incidence. Youngest patient was 18 year old and eldest patient was 75 years. The mean age in LMR and MBR group of studies are 42.32yrs and 43.46yrs respectively.

Sex	Incidence		Total (percentage)
	Indirect (percentage)	Direct (percentage)	
Male	80	20	100

In the present study all are male patients.

Table 3: SEX distribution.

SEX	Group		
	LMR	MBR	Total
Male	50	50	100
Total	50	50	100

Table 4: Personal History.

PERSONAL HISTORY(S/NS)	Group			Chi	p value
	LMR	MBR	Total		
NS	25(50%)	15(30%)	40(40%)	4.167	0.041
S	25(50%)	35(70%)	60(60%)		
Total	50(100%)	50(100%)	100(100%)		

In the present study, majority of patients were smokes (60 out of 100 patients).

Table 5: Occupation incidence.

OCCUPATION	Group			Chi	p value
	LMR	MBR	Total		
B	0	4	4	6.21	0.624
BC	7	4	11		
F	10	12	22		
L	15	12	27		
O	2	2	4		
R	3	4	7		
S	1	2	3		
SK	6	6	12		
T	6	4	10		
Total	50	50	100		

In the present study, the occurrence of inguinal hernia was found to occur most commonly among the manual

labourers and the farmers, accounting for 27% and 22% of the cases even though it's not statistically significant.

Table 6: Clinical Presentation.

Symptom	No.of cases	%
Swelling	74	74
Pain and swelling	26	26
Total	100	100

In the present study of 100 patients, 74% presented with only swelling and 26% presented with both pain and swelling.

Table 7: Hernia Side & Types.

Side of Hernia	Hernia Type	Group			Chi	P value
		LMR	MBR	Total		
Left(L)	Direct(D)	2(40%)	7(32%)	9(33%)	0.123	0.726
	Indirect(I)	3(60%)	15(68%)	18(67%)		
	Total	5(100%)	22(100%)	27(100%)		
Right(R)	Direct(D)	4(9%)	7(25%)	11(15%)	3.501	0.061
	Indirect(I)	41(91%)	21(75%)	62(85%)		
	Total	45(100%)	28(100%)	73(100%)		

In present study 80% were indirect and 20% were direct inguinal hernia. The incidence of inguinal hernia was found to be maximum on right-side (73 %, 73 out of 100

cases) & of indirect type (80%, 80 out of 100 cases). The highest incidence of inguinal hernia was seen as right indirect inguinal hernia(62%, 62 out of 100).

Table 8: Type of Surgery.

Type of surgery	Indirect	Direct	Total no of cases
Modified Bassini repair	36	14	50
Lichtenstein mesh repair	44	6	50
Total	80	20	100

In this study, 50 cases(44-Indirect, 6-Direct) underwent Lichtenstein hernioplasty with polypropylene mesh and

50 cases(36-Indirect, 14-Direct) underwent Modified Bassini repair under spinal anaesthesia.

Table 9: Comparison of mean duration of surgery/operating time between two groups.

	No	Mean MEAN OPERATING TIME(MIN)	SD	Minimum	Maximum	p value
LMR	50	42.66	1.72153	40	45	<0.001
MBR	50	48.44	1.7975	45	52	
Total	100	45.55	3.39154	40	52	

In the present study, it was found that the mean duration of surgery in LMR was 42.66 minutes, whereas in MBR

it was 48.44 minutes. The difference was found to be statistically significant (p value < 0.05).

Table 10: Comparison of post-operative pain between two groups.

POST OPERATIVE PAIN	Group			Chi	p value
	LMR	MBR	Total		
Mild	18	20	38	19.794	<0.001
Moderate	17	28	45		
Severe	0	2	2		
No Pain	15	0	15		
Total	50	50	100		

Post operative pain was measured using VRS, 24 hours after surgery. It was observed that 38 patients complained of mild pain, 45 patients had moderate pain, and 2 patient had severe pain. 18 patients(36%) of the Lichtenstein mesh repair group and 20 patients(80%) of the Modified Bassini repair group complained of mild pain. 17 patients(34%) of Lichtenstein repair group and

28 patients(56%) of Modified Bassini repair group complained of moderate pain. 15 patients(30%) of the Lichtenstein mesh repair group had no complain of post-operative pain and 2 patients had severe pain in MBR group. The difference was found to be statistically significant on comparing the two groups ($p < 0.05$)

Table 11: Post Operative Complications and Recurrence.

Complications	LMR	MBR	Total	p value
SEROMA	8(16%)	1(2%)	9(18%)	0.0149
HEMATOMA	7(14%)	1(2%)	8(16%)	0.0278
WOUND INFECTION	3(6%)	3(6%)	6(12%)	1.0000
MESH RELATED COMPLICATION	0(0%)	0(0%)	0(0%)	1.0000
TESTICULAR PAIN &; SWELLING	2(4%)	8(16%)	10(20%)	0.0466
TESTICULAR ATROPHY	0(0%)	0(0%)	0(0%)	1.0000
CHRONIC GROIN PAIN	2(4%)	8(16%)	10(20%)	0.0466
RECURRENCE	0(0%)	1(2%)	1(2%)	0.3173

In the present study, it was found that seroma was the most common complication in both the groups – 8 cases (16 %) in Lichtenstein mesh repair and 1 cases (2%) in Modified Bassini repair. Testicular pain and swelling and chronic groin pain were seen to occur more commonly in patients undergoing MBR, though the difference was not found to be statistically significant. Incidence of haematoma was 7(14%) in Lichtenstein mesh repair and

1(2%) in Modified Bassini repair and all are statistically significant. Chronic pain occurs in 16% of MBR group and only 4 % in LMR group which is statistically significant. 1 recurrence was noted in the Modified Bassini repair group.

Table: 12 Ambulation day.

	N	Mean DAY OF AMBULATION	SD	Minimum	Maximum	p value
LMR	50	3.12	0.872	2	5	<0.001
MBR	50	3.98	0.82	3	5	
Total	100	3.55	0.947	2	5	

In the present study, the time taken for ambulation was 3.12 days in LMR, and 3.98 days in MBR.

Table: 13 hospital stay.

	N	Mean Hospital Stay(Days)	SD	Minimum	Maximum	p value
LMR	50	4.92	0.829	4	6	<0.001
MBR	50	5.86	0.783	5	7	
Total	100	5.39	0.931	4	7	

The mean period of hospitalization was 4.92 days in case of Lichtenstein mesh repair, and 5.86 days in case of MBR. This is statistically significant.

Table 14: Showing distribution of return to normal work in the study population.

Return to Normal activity(days)	Lichtenstein Mesh Repair(%)	Modified Bassini Repair(%)
1-7	18	14
8-14	50	46
15-21	32	40

Mean day of return to normal activity is n MBR and LMR respectively 12.94 and 12.26 days however it is not significant statistically.

Table: 15 Follow up of patients.

Follow up	LMR	MBR	LMR	MBR	p value
	No		Yes		
1 WEEK	0	0	50	50	1.000
1 MONTH	0	0	50	50	1.000
3 MONTHS	2	1	48	49	0.558
6 MONTHS	7	5	43	45	0.538
12 MONTHS	12	11	38	39	0.812

The patients were followed up at regular intervals & there were many drop outs at different times of follow up as shown in the table.

DISCUSSION

In the present study, the age varies from 18 years to 75 years (age group <18 years and >75 years has been already excluded from the study). The highest incidence was seen in the age group 51 to 60 years, which is similar to the study done in the past by Paola Primatesta and Michael J Goldacre^[15], Gebrge H Sakorafas et al^[16], Srinivas Somashekar et al^[17], Sriramoju Sreedhar et al^[18] and Gorad K P et al.^[19] All patients are males which is similar to the study by Gorad K Pet al.^[19] Smoking has been identified as one of the major risk factors, although not exactly same but is comparable with studies in the past by Srinivas Somashekar et al^[17] and Dr Suresh Patil et al.^[20] The farmers, labourers and rickshaw pullers who constitute 56% of the affected cases, are comparable with study of M. Bay Nielsen^[21], Srinivas Somashekar et al^[17], Sriramoju Sreedhar et al^[18], Dr Suresh Patil et al^[22], Seong-Kyu Kang et al.^[23]

Of 100 patients, 74% presented with only swelling and 26% presented with both pain and swelling, similar result can be seen in Dr Suresh Patil et al^[22] study. 73 of cases had right sided and 27 had left sided hernia which is in accordance to the various studies done by Lawrence S.Falis^[24], L. Kraeer Ferguson and Mark W. Woleot^[25], J.H. Abramson et al^[26], Mohammad Nasir et^[27], Srinivas Somashekar et al^[17], Sriramoju Sreedhar et al.^[18] The incidence are indirect inguinal hernia (80%), direct inguinal hernia (20%) which is similar to the study done in the past by Naveen N, Srinath R.^[28] 2014, Roderick v. Grace, and Vansel S. Johnson^[29], George H Sakorafas et al^[16], K Aravindhan^[30], Mohammad Nasir et al^[27], Joseph B Mabula^[31], Srinivas Somashekar et al^[17] and Lawrence S. Fallis.^[24]

The mean operative time for mesh repair was 42.6 minutes, while that of non-mesh repair was 48.44

minutes. similar results can be seen in studies done by Dr. R. Suresh kumar et al^[22], Naveen N, Srinath R.^[28] and Ajmal Shahet al.^[32]

There was significant difference in post-operative pain as measured by VRS^[33] at 24 hours post surgery, 36% patients (18 out of 50) in the LMR group complained of mild pain, while 56% patients (28 out of 50) in the MBR group complained of moderate pain. This is comparable to following studies, Arshad M Malik et al^[34], Dr. A. Sai Datta et al^[20], Naveen N, Srinath R^[28] and Callesen T et al.^[35] 1 patient of MBR and 8 patients of LMR developed seroma requiring drainage. The results of present study is in agreement with the studies of Gebrge H Sakorafas et al^[16], Ajmal Shah et al^[32], Dr.A. Sai Datta et al^[20], Frederica Jessie Tchoungui Ritz^[36], mSuresh Kumar, R et al^[22], Naveen N, Srinath R^[28] and Anantha Kumar Nateson et al.^[37] 1 case out of 50 in MBR and 7 cases out of 50 LMR developed hematoma which is in agreement with studies done by George H Sakorafaset et al^[16], Ajmal Shah et al^[32], Dr.A. Sai Datta et al^[20] and Anantha Kumar Nateson et al^[37] except in Naveen N , Srinath R. 2014 feb study were hematoma was observed more in MBR. There were 6(6 %) cases of wound infection out of 100 inguinal hernia repair which is equal in both groups (3 cases of MBR and 3 cases of LMR). Infections were treated with antibiotics and regular dressings. But the studies done in the past, wound infection was same as in our study with higher incidences in LMR group like Dr. A. Sai Datta et al.^[20] The 2(4%) patients of LMR and 8(16%) patients of MBR group developed testicular pain and swelling even though the difference was not found to be statistically significant. This result is much higher as compared to the results obtained from the studies of Bringman et al^[38] and Gebrge H Sakorafas et a.^[16] In our study chronic groin pain occurred in 8(16%) cases of MBR, which is more when compared to LMR and 2(4%) of LMR and is comparable with The EU Hernia

Trialists Collaboration^[40] (2002) study. The time taken for ambulation was (3.12±0.87 days) in mesh repair, and (3.98±0.82 days) in non-mesh repair. The difference was found to be statistically significant. The mean period of hospitalization was 4.92 days in case of LMR, and 5.86 days in case of MBR. This is consistent with studies of Kedar P Goradet al^[19], MM Harjai et al^[39] and Dr. A. Sai Datta et al.^[20] Return to work in LMR-12.26±3.75 days and MBR-12.94±3.49 days respectively. The recorded results are in agreement with study results of Dr.R.SURESH KUMAR et al^[22], Dr.A. Sai Datta et al.^[20]

Only 1 case of recurrence following MBR more when compared to LMR, which is comparable to the The EU Hernia Trialists Collaboration^[40] (2002) study. There was no case of mortality in the present study like that observed in following studies. This is similar to Mohammad Nasir et al^[91], 2013 study.

Follow up: At 3 months, 3 patients were lost to follow-up (2 in LMR group and 1 in MBR group), 97 reported for follow up. At 6 months, 9 patients were lost to follow-up (5 in LMR group and 4 in MBR group), 88 reported for follow up. At 1 year, 11 patients were lost to follow-up (5 in LMR and 6 in MBR), 77 reported for follow up.

CONCLUSIONS

In the present study, it was observed that inguinal hernias can affect any age group but, were most commonly encountered in older age group and in males. Incidence of inguinal hernia was more common in occupations involving strenuous work and Smoking is found to be an important risk factor. Right side indirect inguinal hernia was the most common type of inguinal hernia. A painless reducible inguino-scrotal swelling with positive cough impulse was the most common and cardinal presentation of the patients.

It was observed that the duration of surgery was lesser in the Lichtenstein mesh-repair group as compared to the MBR group. In the post-operative period, there was a marked difference in post-operative pain in LMR as compared to the MBR group, with the latter group demonstrating higher incidence and severity of pain & other significant difference in the postoperative complications was observed, except for seroma and haematoma which were seen more commonly in the Lichtenstein mesh repair group. The post-operative time for mobilisation and period of hospital stay was significantly less in the Lichtenstein mesh-repair group. Differences were also observed in frequency and severity of chronic groin pain in the two groups, with MBR group displaying a higher incidence. 1 recurrence was found in the MBR group.

Surgery is the mainstay in treatment of inguinal hernias. Lichtenstein tension free mesh repair was the commonest and gold standard of procedure. MBR represents a good

alternative to the gold standard (LMR) for inguinal hernia. The present comparative study does not show any distinct advantages of one repair over the other but LMR gives superior results compared to MBR with regard to technical simplicity, smaller dissection and early ambulation and decreased hospital stay with an acceptable post-operative rehabilitation and relative regards to recurrence. However, MBR offers advantage of being cost effective and is still being useful for certain conditions in settings which doesn't allow the use of mesh for repair like in an infected scenario. However the study needs to be conducted on a larger size of sample and for a longer period of time for focusing on the short and long-term results specifically in the group of currently accepted indications for tissue repair (i.e. contaminated cases, young adults and in cases of patients refusal to mesh implants).

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